The Pharma Innovation Journal 2023; 12(9): 1064-1068

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; 12(9): 1064-1068

www.thepharmajournal.com
Received: 09-06-2023
Accepted: 13-07-2023

SR Pawar
Department of Entomology, B.A. College of Agriculture AAU, Anand, Gujarat, India

MR Dhande
Samarth Agriculture College, Deulgaon Raja, Maharashtra, India

MO Rajput
Samarth Agriculture College, Deulgaon Raja, Maharashtra, India

Corresponding Author:
SR Pawar
Department of Entomology, B.A. College of Agriculture AAU, Anand, Gujarat, India

Integrated pest management studies against pests of *Abelmoschus esculentus* (L.) Moench

SR Pawar, MR Dhande and MO Rajput

Abstract
Studies on integrated pest control techniques were conducted in order to combat the okra pest complex, *Abelmoschus esculentus* (L.) Moench. The main pests of the okra crop were the insects jassid, whitefly, mite, and shoot and fruit borer. The IPM modules M2 (Im-idaclorpid + *B. bassiana* + Spinosad + Destruction of infested shoots and fruits) and M1 (Im-idacloprid + *B. bassiana* + Spinosad) were found to be most effective against jassid and whitefly, while modules M4 (*B. bassiana* + NSKE + Acephate + Btk + Destruction of infested shoots M8 (*M. anisopliae*+ NSKE + Spinosad + Btk + Destruction of infected shoots and fruits) and M3 (*B. bassiana* + NSKE + Spinosad + T. chilonis + Destruction of infested shoots and fruits) were determined to be the most efficient modules against shoot and fruit borer. The standard check M9 (Dimethoate with alternate sprays of endosulfan) had the highest yield of okra fruits, followed by M6 (Acephate + *M. anisopliae*+ Spinosad + Destruction of infested shoots and fruits), and M4 (*B. bassiana* + NSKE + Acephate + Btk + Destruction of infested shoots and fruits) had the lowest yield. The normal check M9 (Dimethoate with alternating spray of endosulfan) and module M5 (Acephate + *M. anisopliae*+ Spinosad) both had the greatest benefit cost ratios, whereas M3 (*B. bassiana* + NSKE + Spinosad + T. chilonis + Destruction of infected shoots and fruits) had the lowest benefit cost ratio.

Keywords: *Abelmoschus esculantus,* IPM

Introduction

Due to its great nutritional and therapeutic value, okra, also known as lady's finger or bhindi (*Abelmoschus esculentus* (L.) Moench), is a widespread fruit and vegetable crop. Okra is grown all throughout India for its immature, sensitive fruits, taking up more than 0.45 million hectares and producing 4.80 million tonnes annually. It is farmed in Rajasthan over an area of 5090 hectares, producing 12770 tonnes annually (Anonymous, 2009–10) [2]. Okra plants are used to treat conditions including kidney stones, leucorrhoea, backaches, and goiter in people. From germination through harvest, a variety of insect pests assault the okra crop. The most harmful pests of okra in Rajasthan are jassid, *A. biguttula biguttula*, whitefly, *B. tabaci*, shoot and fruit borer, *Earias* spp., and mite, *T. cin-nabarinus* (Choudhary and Dadheech, 1989; Dangi and Ameta, 2005; Meena and Kanwat, 2005) [5, 6, 11]. Jassids inject a poisonous chemical into the bottom surface of the leaves while sucking the cell sap, which causes the leaves to curl and stunts plant development. Whiteflies served as the vector for the viral disease transmission from sick to healthy plants. Earias spp. larvae eat inside the developing fruits, flower buds, and shoot tips of young plants, which causes the shoot growth to stop and the dropping of buds and flowers. The impacted fruits are made unusable for seed collection as well as human eating. Mites create white spots on leaves by sucking the cell sap, which is then covered by dense webs. These webs become clogged with earth particles under windy conditions. The photosynthesis process is slowed down, the damaged leaves lose their green color, dry up, and drop before they are fully mature, which ultimately leads to poor fruit setting. Several insecticides are recommended by many workers to reduce losses brought on by insect pests in the okra crop (Samuthiravelu and David, 1991; Tomar, 1998; Singh *et al*., 2004) [17, 22, 20]. However, these insecticides damage the environment by leaving undesirable residues, which leads to the eradication of natural enemies and other non-target spp., risk to human health, insecticide resistance, and the reemergence of pests. (Yathiraj and Jagdish, 1999; Ambekar *et al*., 2000; Rosaiah, 2001; Thakkar and Rote, 2001; Mishra and Mishra, 2002; Shinde *et al*., 2007) [24, 1, 16, 21, 13, 19] Biopesticides play a significant role in the fight against pests on okra crops. However, when applied alone, biopesticides are not as effective as conventional insecticides. As a result, in the current study, the bio-efficacy of a few IPM modules (which progressively apply newer insecticides, bio-pesticides, and plant products) was evaluated for a successful control of the okra pest complex.

Materials and Methods

The current studies on the okra crop under field circumstances were carried out during the kharif season at Horticulture Farm, B.A. College of Agriculture, Anand Agricultural University, Anand, Gujarat.

Details of Treatments used

S. No.	Insecticides	Trade Name	Formulation	Concentration (%)/dosage
1.	Imidaclorpid	Confidor	17.8 SL	0.005
2.	Spinosad	Tracer	45 SC	0.01
3.	Acephate	Orthene	75 SP	0.05
4.	Dimethoate	Rogor	30 EC	0.03
5.	Endosulfan	Thiodon	35 EC	0.05
6.	*B. bassiana*	Racer-BB	1.15 WP	1 x 10^8 spore l^{-1}
7.	*M. anisopliae*	Pacer-MA	1.15 WP	1 x 10^8 spore l^{-1}
8.	Btk	Dipel	8 L	1 ml l^{-1}
9.	NSKE	Freshly prepared	-	5
10.	*t. chilonis*	-	-	7 cards ha^{-1}

From the time of their arrival until the last fruit of the crop was picked, the observations on insect pests were noted. With 10 treatments, including an untreated control, each duplicated three times, the experiment was set up using a straightforward randomized block design (RBD). The experiment was conducted using the okra variety Arka Anamika, which was seeded on July 25 during kharif. The population of sucking insect pests, including jassids and whiteflies, was counted visually (absolute counting) in the early morning hours on a weekly basis. In each plot, five plants were chosen at random and marked, along with the top, middle, and bottom three leaves of each plant.

The shoot and fruit borer damage indexes were computed. Following the emergence of damage until the last crop picking, the observations on shoot damage by Earias spp. were made on ten tagged plants per plot at weekly intervals by visually counting the plants whose tops were affected. When there was fruit damage, observations were made on the proportion of infected fruits based on weight and quantity at each picking.

Five randomly chosen plants from each plot were used to count the *Tetranychus cinnabarinus* population on the okra crop every week from the time of infection to the last fruit plucking. In order to do this, nine leaves—three from the top (young), middle (mature), and bottom (old) portions of the tagged plants—were randomly selected, collected in distinct, appropriately labelled polythene bags, and brought to the laboratory without disturbing the mites for population assessment under stereo binocular microscope. The leaves' upper and bottom halves were both studied.

The treatments (I spray) were applied once a large enough population of insect pests had amassed, and the succeeding sprays were applied once the pest population had rebounded. At weekly intervals, two non-additive releases of *T. chilonis* at 7 tricho cards ha^{-1} were made. Additionally, infected fruits and shoots were routinely destroyed. After 3 and 7 days of treatment application, the percentage of jassid, whitefly, and mite populations, as well as the percentage of Earias spp. infection on shoots and fruits on okra, were measured in all the sprays. Fruit yield statistics was translated into quintal per hectare.

Table 1: Bio-efficacy of IPM modules against jassid, whitefly and mite on okra crop in *kharif*

Treatments	Per cent reduction of jassid, whitefly and mite population days after sprays#					
	Jassid		Whitefly		Mite	
	Three	Seven	Three	Seven	Three	Seven
M_1 - Imidacloprid + *B. bassiana* + spinosad	78.84	74.20	77.30	72.14	31.62	27.02
	(62.58)	(59.47)	(61.55)	(58.12)	(34.20)	(31.31)
M_2 -Imidaclorpid + *B. bassiana* + spinosad +	82.72	77.62	78.67	71.64	35.78	29.78
DISF	(65.42)	(61.75)	(62.51)	(57.80)	(36.75)	(33.09)
M_3 -*B. bassiana* + NSKE + spinosad + *T.*	53.72	50.71	55.66	51.14	45.72	39.05
chilonis + DISF	(47.12)	(45.40)	(48.27)	(45.63)	(42.53)	(38.70)
M_4 -*B. bassiana* + NSKE + Acephate + *Btk* +	52.80	53.28	55.66	49.14	58.72	52.17
DISF	(46.61)	(46.89)	(48.27)	(44.48)	(50.01)	(46.26)
M_5 -Acephate + *M. anisopliae*+ spinosad	62.15	59.20	60.15	62.13	33.56	28.32
	(52.06)	(50.30)	(50.89)	(52.00)	(35.43)	(32.14)
M_6 -Acephate + *M. anisopliae*+ spinosad +	60.77	60.06	62.12	60.75	38.12	31.48
DISF	(51.24)	(50.83)	(52.00)	(51.24)	(38.12)	(34.14)
M_7 -*M. anisopliae*+ NSKE + Acephate + *T.*	50.15	55.87	53.11	56.16	55.72	50.11
chilonis + DISF	(45.11)	(48.39)	(46.78)	(48.56)	(48.27)	(45.06)
M_8 -*M. anisopliae*+ NSKE + Spinosad + *Btk* +	48.12	43.26	45.72	43.19	47.70	42.42
DISF	(43.91)	(41.15)	(42.53)	(42.82)	(43.68)	(40.63)
M_9 -Dimethoate with alternate spray of	85.03	79.73	82.72	76.21	59.17	54.76
endosulfan (check)	(67.21)	(63.22)	(65.42)	(60.80)	(50.30)	(47.75)
M_{10} -Control (untreated)	0.00	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
S.E.m±	2.07	1.87	2.05	1.85	1.42	1.31
CD at 5%	6.16	5.57	6.10	5.51	4.22	3.90

Mean of three replications.

Figures in parentheses are angular transformed values. DISF = Destruction of infested shoots and fruits

Table 2: Bio-efficacy of IPM modules against *Earias spp*. on okra crop in *kharif*

Treatments	Shoot infestation		Per cent fruit infestation days after sprays#			
			Number basis		Weight basis	
	Three	Seven	Three	Seven	Three	Seven
M_1 - Imidacloprid + *B. bassiana* + spinosad	9.15	9.81	8.85	10.02	8.81	9.96
	(17.66)	(18.24)	(17.36)	(18.43)	(17.26)	(18.43)
M_2 -Imidaclorpid + *B. bassiana* + spinosad +	6.30	6.45	5.27	6.45	5.22	6.41
DISF	(14.54)	(14.77)	(13.31)	(14.77)	(13.18)	(14.65)
M_3 -*B. bassiana* + NSKE + spinosad + *T.*	3.58	3.99	4.12	4.50	4.06	4.48
chilonis + DISF	(10.94)	(11.54)	(16.68)	(12.25)	(11.68)	(12.25)
M_4 -*B. bassiana* + NSKE + Acephate + *Btk* +	10.25	10.35	9.33	10.44	9.30	10.40
DISF	(18.72)	(18.81)	(17.76)	(18.81)	(17.76)	(18.81)
M_5 -Acephate + *M. anisopliae*+ spinosad	10.05	10.25	8.17	9.35	8.07	9.27
	(18.53)	(18.72)	(16.64)	(17.85)	(16.54)	(17.76)
M_6 -Acephate + *M. anisopliae*+ spinosad +	7.20	7.30	5.17	6.35	5.15	6.29
DISF	(15.56)	(15.68)	(13.18)	(14.65)	(13.18)	(14.54)
M_7 -*M. anisopliae*+ NSKE + Acephate + *T.*	10.40	10.85	9.65	10.85	9.60	10.81
chilonis + DISF	(18.81)	(19.28)	(18.05)	(19.19)	(18.05)	(19.19)
M_8 -*M. anisopliae*+ NSKE + Spinosad + *Btk* +	3.25	3.87	3.50	3.90	3.41	3.86
DISF	(10.47)	(11.39)	(10.78)	(11.39)	(10.63)	(11.39)
M_9 -Dimethoate with alternate spray of	5.95	6.20	6.00	7.20	5.95	7.15
endosulfan (check)	(14.18)	(14.42)	(14.18)	(15.56)	(14.18)	(15.56)
M_{10} -Control (untreated)	19.07	19.92	25.75	28.11	25.70	28.06
	(25.91)	(26.49)	(30.46)	(32.01)	(30.46)	(32.01)
S.E.m±	0.61	0.60	0.58	0.59	0.56	0.58
CD at 5%	1.82	1.78	1.72	1.77	1.66	1.71

\# Mean of three replications.

Figures in parentheses are angular transformed values. DISF = Destruction of infested shoots and fruits

Table 3: Comparative economics of the treatments on okra crop in *kharif*

Treatments	Yield of healthy fruits (q ha^{-1})	Increase in yield over control (q ha^{-1})	Return of increased yield (Rs)	Total cost/ expenditure (Rs)	Net profit (rs ha^{-1})	B:C ratio
M_1 - Imidacloprid + *B. bassiana* + spinosad	91.07	35.09	42108	3151	38957	13.36
M_2 - Imidacloprid + *B. bassiana* + spinosad + DISF	96.55	40.57	48684	3510	45174	13.87
M_3 - *B. bassiana* + NSKE + spinosad + *T. chilonis* + DISF	85.90	29.92	35904	5203	30701	6.90
M_4 - *B. bassiana* + NSKE + Acephate + *Btk* + DISF	83.35	27.37	38844	4077	28767	8.05
M_5 -Acephate + *M. anisopliae*+ spinosad	104.22	48.24	57888	3008	54880	19.24
M_6 - Acephate + *M. anisopliae*+ spinosad + DISF	106.30	50.32	60384	3368	57016	17.92
M_7 - *M. anisopliae*+ NSKE + Acephate + *T. chilonis* + DISF	80.28	24.30	29160	3585	25575	8.13
M_8 - *M. anisopliae*+ NSKE + Spinosad + *Btk* + DISF	101.00	45.02	54024	5381	48643	10.03
M_9 - Dimethoate with alternate spray of endosulfan (check)	108.60	52.62	63144	2214	60930	28.52
M_{10} - Control (untreated)	55.98	0.00	-	-	-	-

DISF = Destruction of infested shoots and fruits

Results and Discussion

A. biguttula biguttula jassid and *B. tabaci* whitefly according to data in Table 1, M9 (Dime-thoate with alternate sprays of endosulfan) proved to be the most effective module against jassid and whitefly standard checks, followed by M2 (Imidaclorpid + *B. bassiana* + Spinosad + Destruction of infested shoots and fruits) and M1 (Imidacloprid + *B. bassiana* + Spinosad). The modules M6 (Acephate + *M. anisopliae*+ Spi-nosad + Destruction of infested shoots and fruits), M5 (Acephate + *M. anisopliae*+ Spinosad), and M7 (*M. anisopliae*+ NSKE + Acephate + T. chilonis + Destruction of infested shoots and fruits) were found to be moderately effective, The current results are consistent with those of Kumar *et al.* (2001) [8], who indicated that endosulfan, followed by Achook and NSKE, was most efficient against jassid on okra. The current findings concur with those of Mishra (2002) [12], who claimed that imidacloprid and thia-methoxam were the most effective anti-jassid agents, followed by dimethaore and cypermethrin. According to Sharma and Sinha (2009) [18], okra seeds treated with imidacloprid and thiamethoxam showed significantly less jassid. The current findings are supported by Praveen and Dhandapani's (2001) [14] discovery that the bioagent Chrysaiperla carnea with Econeem is effective against okra pest. According to Chakraborti (2001) [4], the biorational integrated method was highly effective against jassid and whiteflies, which supports the current findings. The outcomes are consistent with those reported by Thakkar and Rote (2001) [21], who claimed that IPM modules consisting of intercropping maize with okra, application of mehyl-odemeton, release to *Trichogramma chilonis* and *Chrysopa scelestes*, application of Btk and NPV, mechanical destruction of affected shoots and fruits were found to be effective in controlling jassid. According to Bindu and Panickar *et al*. (2003) [3], the present findings are supported by their claim that the botanical pesticide Achook alone or in combination with endosulfan gave the maximum control of sucking pests. According to Rosaiah (2001) [16], mineral oil, then NSKE and Neemazal, were successful treatments for jassid. Thrips, leafhoppers, and aphids are the three main sucking pests, and Preetha and Nadarajan (2007) [15] discovered that biointensive and insecticidal modules were equally effective against them.

T. cinnabarinus, a mite However, in comparison to the normal check M9, the results reported in table 1 showed that modules M4 and M7 were more effective against mites. M1 was determined to be the least effective module, followed by M6, M2, and M5, while M8 and M3 were shown to be fairly successful. The current findings somewhat support those of Singh *et al*. (2004) [20], who claimed that the okra-infesting mite, *T. cin-nabarinus*, was resistant to dicofol, propargite, monocrotophos, and NSKE. Similar to this, Mani *et al*. (2003) [9] observed that products containing dicofol, ethion, and neem were successful in controlling two spotted mite on okra crops. The plant products *Azadiracta indica*, *Clerodendron inermae*, *Duranta repens*, *Eucalyptus globules*, *Leucas aspera*, and *Vitex negunda* were suitable for integrated management of the mite *T. urticae*, according to Yathiraj and Jagdish (1999) [24], who also confirm the current findings.

Earias species is the shoot and fruit borer. The information in table 2 showed that the conventional check module of IPM was much more effective than the untreated control against *Earias* spp. on okra crops. M8 and M3 were shown to be the most effective modules. M9, M2, and M6 were found to be in a group of modules that were somewhat effective, but M7 was found to be the least effective, followed by M1, M5, and M4. The current findings support those of Tomar (1998) [22], who discovered that Dipel + en-dosulfan and Dipel + fenvalerate were more successful in lowering percent shoot and fruit infestation. According to Desai and Kapadia (2007) [7], combining Btk with endosulfan and fenal-erate resulted in 100% death within two days. The present findings are supported by little fruit borer infection data from spinosad collected by Shinde *et al*. (2007) [19]. The current findings support those of Samuthiravelu and David (1991) [17], who found that neem oil and endosulfan, both separately and in combination, decreased fruit borer damage in okra crops.

According to Mathur *et al*. (1997) [10], a combination of monocrotophos treatment and two sprays of Btk + methomyl resulted in the least amount of fruit damage. Application of the predator *Chrysolperla carnea* + Econeem was successful in minimizing the fruit damage brought on by *Earias* spp., according to Praveen and Dhandapani's (2001) [14] findings. According to Ambekar *et al*. (2000) [1] and Bindu Panichkar *et al*. (2003) [3], the botanical pesticide Achook was most effective against fruit borer when used alone or in conjunction with endosulfan. Mishra and Mishra (2002) [13] discovered that using Malathion and the botanical pesticide Biotox in various combinations resulted in the least amount of fruit damage in an okra crop. According to Dangi and Ameta (2005) [6], IPM modules with two -cyfluthrin sprayings—the first at the blooming stage and the second 15 days later—provide the most effective control of fruit borers while causing the least amount of fruit loss. Additionally, they discovered that spray mixtures of acephate, -cyfluthrin, and neemraj were successful in controlling fruit borer. The findings support those of Yadav *et al*. (2008b) [23], who discovered that using a Btk-neem formulation with azadirachtin-endosulfan-*Trichogramma* at intervals of 15 days decreased shoot and fruit borer infestation.

The information in table 3 showed that the standard check M9, which was followed by modules M6, M5, M2, and M1, had the highest net profit. The minimum was found in module M7, which was followed by M3 and M4. Maximum advantage was provided by standard check M9, followed by M5, M6, M2, and M1, while minimal benefit was provided by M3, then M4, then M7. The findings are supported by Tomar's (1998) [22] recommendation that Dipel + fenvelerate therapy has the highest cost-benefit ratio, followed by Dipel + accephate and Dipel + endosulfan. The endosulfan-*Trichogramma* offered the greatest cost: benefit ratio, followed by the neemarin-*Trichogramma*, according to Yadav *et al*. (2008a) [23]. The present findings are supported by Parveen and Dhandapani's (2001) [14] study of a greater cost-benefit ratio in applications of Chrysoperla carnea and econeem.

Conclusion

From above studies it can be concluded that use of various IPM strategies in combination *viz.* mechanical (Destruction of infested shoots and fruits), biorationals (*B. bassiana*) and chemical control (Im-idaclorpid and Spinosad) would definatly help to reduce the cost and amprove cost benefit ratio in okra.

References

1. Ambekar JS, Panwar AS, Sakhare MV. Bioefficacy of certain Neem products against okra fruit borer. Journal of Maharashtra Agriculture University. 2000;25(1):42-45.
2. Anonymous. Indian Horticulture Database. National Horticultural Board, Gurgaon; c2009-10.
3. Bindu Panickar, Barpoda TM, Patel JR, Patel JJ. Evaluation of various schedules based on botanical and synthetic insecticides in okra ecology. Indian Journal of Entomology. 2003;65(3):344-346.
4. Chakraborti S. An alternate approach in the management of okra fruit borer. Journal of Applied Zoological research. 2001;12(1):47-50.
5. Choudhary HR, Dadheech LN. Incidence of insect attacking okra and the avoidable losses caused by them. Annals of Arid zone. 1989;28(3-4):305-307.
6. Dangi PR, Ameta OP. Incidence of okra fruit borer, *Earias vitella* (Fab.) National Conference on applied Entomology, Sept. 26-28, 2005 at Rajasthan College of agriculture, Udaipur; c2005. p. 84-85.
7. Desai VS, Kapadia MN. Efficacy of Bacillus thuringiensis var. kurstaki alone and in combination with insecticides under laboratory conditions. Pestology. 2007;31(8):16-19.
8. Kumar M, Singh AK, Kumar M. Bioefficacy of insecticides against the cotton jassid, *Amrasca biguttula biguttula* (Ishida) on okra. Pest Management and Economic Zoology. 2001;9(1):55-58.
9. Mani C, Kumar S, Singh RN. Efficacy of acaricides and botanicals against two spotted mite, Tetranychus urticae Koch on okra. Annals of Plant Protection Science. 2003;11(1):153-154.

10. Mathur NM, Sharma GK, Queshi QG, Reddy PP, Kumar NKK, Verghese A. fruit borer (*Earias* spp.) management on okra in semi arid of Rajasthan. Advance IPM Horticultures Crops; c1997. p. 121-123.
11. Meena NK, Kanwat PM. Broad reconnaissance of insect pest of okra in semi-arid region of Rajasthan. National Conference on applied Entomology, Sept. 26-28, 2005 at Rajasthan College of agriculture, Udaipur; c2005. p. 261-262.
12. Mishra HP. Field evaluation of some newer insecticides against aphid (*Aphis gosspii*) and jassid (*Amrasca biguttula biguttula*) on okra. Indian Journal of Entomology. 2002;64(1):80-84.
13. Mishra NC, Mishra SN. Impact of biopesticides on insect pests and defenders of okra. Indian Journal of Plant Protection. 2002;30(1):99-101.
14. Praveen PM, Dhandapani N. Ecofrindly management of major pests of okra [*Abelmoschus esculents* (L.) Moench]. Journal of Vegetable Crop Production. 2001;7(2):3-12.
15. Preetha G, Nadarajan L. Validation of IPM modules against sucking pests of okra in Karaikal. Indian Journal of Entomology. 2007;69(3):210-214.
16. Rosaiah B. Performance of different botanicals against the pest complex of bhendi. Pestology. 2001;25(4):17-19.
17. Samuthiravelu P, David BV. Bioefficacy of neem oil and endosulfan against the fruit borer *Earias vittella* (Fab.) (Noctuidae: Lepidoptera) on okra. Madras Agriculture Journal. 1991;78(1-4):77-78.
18. Sharma RK, Sinha SR. Insect pests management in okra with baby corn as border crop and ecofriendly insecticides. Journal of Insect science. 2009;22(3):254-258.
19. Shinde BD, Sarkate MB, Nemade PW, Sable YR. Bioefficacy of botanical, microbial and synthetic insecticides against okra fruit borer. Pestology. 2007;31(3):19-22.
20. Singh DK, Sardana HR, Kadu LN. efficacy of certain pesticides against red spider mite, *Tetranychus cinnabarinus* Koch. infesting okra. Indian Journal of Entomology. 2004;66(3):282-84.
21. Thakkar SK, Rote NB. Studies on integrated pest management in okra, *Ablemoschus esculentus* (L.) Moench. Indian Journal of Applied Entomology. 2001;15(2):35-39.
22. Tomar RKS. Efficacy and economics of bio-pesticides and insecticide combinations against okra shoot and fruit borer. Indian Journal of Entomology. 1998;60(1):25-28.
23. Yadav JB, Singh RS, Tripathi RA. Evaluation of bio-pesticides against pest complex of okra. Annals of Plant Protection Sciences. 2008b;16(1):58-61.
24. Yathiraj BR, Jagdish PS. Plant extracts future promising tools in the integrated management of spider mite, *Tetranychus urticae* (Acari: Tetranychidae). Journal of Acarology. 1999;15(1&2):40-43.